Q9
#3
2
5
Q11

3) a) Confirm $\int x \sin x \, dx = \sin x - x\cos x + C$

$$\frac{d}{dx}\left(\sin x - x\cos x + C\right) = \frac{d}{dx}(\sin x) - \frac{d}{dx}(x\cos x) + \frac{d}{dx}(C)$$

①　②　③

$$= \cos x - \left[(1)\cos x + x(-\sin x)\right] + 0$$

1　2　2

$$= \cos x - \cos x + x \sin x$$

$$= x \sin x$$

?

b) Confirm: $\int \frac{dx}{(1-x^2)^{3/2}} = \frac{x}{\sqrt{1-x^2}} + C$

3) find a deriv & state an integration rule

$$\frac{d}{dx}\left[\sqrt{x^3+5}\right] = \frac{d}{dx}(x^3+5)^{1/2}$$

$$= \frac{1}{2}\left(x^3+5\right)^{-1/2}\left(3x^2\right)$$

$$= \frac{3}{2}\frac{x^2}{\sqrt{x^3+5}}$$

$$\int \frac{3}{2}\frac{x^2}{\sqrt{x^3+5}}\,dx = \sqrt{x^3+5} + C$$

5) $\frac{d}{dx}\sin(2\sqrt{x}) = \cos(2\sqrt{x})\,\frac{d}{dx}(2\sqrt{x})$ $2x^{1/2}$

$= \cos(2\sqrt{x})\left(x^{-1/2}\right)$

$= \dfrac{\cos(2\sqrt{x})}{\sqrt{x}}$

$\int \frac{\cos(2\sqrt{x})}{\sqrt{x}}\,dx = \sin(2\sqrt{x}) + C$

12 15
4 17
8 10

4) $\frac{d}{dx}\left(\frac{x}{x^2+3}\right) = \frac{(1)(x^2+3)-(x)(2x)}{(x^2+3)^2} = \frac{3-x^2}{(x^2+3)^2}$

$$\int \frac{(x^2+3)-(x)(2x)}{(x^2+3)^2}\,dx = \frac{x}{x^2+3} + C$$

$$\int \frac{3-x^2}{(x^2+3)^2}\,dx = \frac{x}{x^2+3} + C$$

8) $\int \sqrt[3]{x^2}\,dx$

$= \int x^{2/3}\,dx$

$= \dfrac{x^{5/3}}{5/3} + C$

$= \dfrac{3x^{5/3}}{5} + C$

$= \dfrac{3\sqrt[3]{x^5}}{5} + C$

$\int \dfrac{1}{x^6}\,dx$

$\int x^{-6}\,dx$

$= \dfrac{x^{-5}}{-5} + C$

$= \dfrac{-1}{5x^5} + C$

$\int x^{-7/8}\,dx$

$= \dfrac{x^{1/8}}{1/8} + C$

$= 8x^{1/8} + C$

$= 8\sqrt[8]{x} + C$

10) $\int x^{2/3} - 4x^{-1/5} + 4 \, dx$

$= \int x^{2/3} dx - 4\int x^{-1/5} dx + \int 4 dx$

$= \frac{x^{5/3}}{5/3} - 4\left(\frac{x^{4/5}}{4/5}\right) + 4x + C$

$\int 4 \, dx = \int 4x^0 dx = 4\frac{x^1}{1} + C = 4x + C$

12) $\int \frac{7}{y^{3/4}} - \sqrt[3]{y} + 4\sqrt{y} \, dy$

$= \int 7y^{-3/4} - y^{1/3} + 4y^{1/2} dy$

$= 7\frac{y^{1/4}}{1/4} - \frac{y^{4/3}}{4/3} + 4\left(\frac{y^{3/2}}{3/2}\right) + C$

$= 28y^{1/4} - \frac{3y^{4/3}}{4} + \frac{8y^{3/2}}{3} + C$

15 $\int x^{1/3}(2-x)^2\,dx = \int x^{1/3}(4-4x+x^2)\,dx$

$= \int 4x^{1/3} - 4x^{4/3} + x^{7/3}\,dx$

$= 4\dfrac{x^{4/3}}{4/3} - 4\dfrac{x^{7/3}}{7/3} + \dfrac{x^{10/3}}{10/3} + C$

$= 3x^{4/3} - \dfrac{12x^{7/3}}{7} + \dfrac{3x^{10/3}}{10} + C$

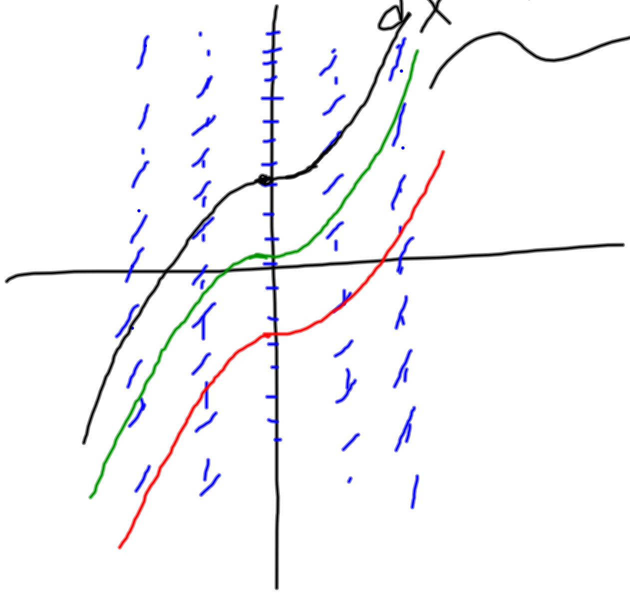
17) $\int \frac{x^5+2x^2-1}{x^4}\,dx = \int \frac{x^5}{x^4}+\frac{2x^2}{x^4}-\frac{1}{x^4}\,dx$

$= \int x + 2x^{-2} - x^{-4}\,dx$

$= \frac{x^2}{2} - \frac{2x^{-1}}{-1} - \frac{x^{-3}}{-3} + C$

41 pre-A

$$\frac{dy}{dx} = x^2 \; ; \; y(0) = 3$$



x	$\frac{dy}{dx} = x^2$
0	0
1	1
-1	1
2	4

$$\frac{dy}{dx} = x^2$$

$$y = \frac{x^3}{3} + C$$

$$3 = \frac{0^3}{3} + C$$

$$3 = C$$

$$y = \frac{x^3}{3} + 3$$

4|a $\frac{dy}{dx} = \sqrt[3]{x}$; $y(1)=2$

Find antiderivative $\left(\frac{dy}{dx}\right) = \left(x^{1/3}\right)$ Find antiderivative

$y = \frac{x^{4/3}}{4/3} + C$

$y = \frac{3\sqrt[3]{x^4}}{4} + C$

$y=2$ when $x=1$

$2 = \frac{3\sqrt[3]{1^4}}{4} + C$

$2 = \frac{3}{4} + C$; $C = \frac{5}{4}$

$\therefore$ $y = \frac{3}{4}\sqrt[3]{x^4} + \frac{5}{4}$

41 b) $\frac{dy}{d\cancel{x}t} = \sin t + 1$; $y\left(\frac{\pi}{3}\right) = \frac{1}{2}$

Find ~~anti~~derivative of $\frac{dy}{d\cancel{x}t}$ = Find antiderivative of $(\sin t + 1)$

$F'(x) = f(x)$

$\int f(x)\,dx = ?\ F(x)$

$y = -\cos t + t + C$

when $x = \frac{\pi}{3}$ (or t) and $y = \frac{1}{2}$

$\frac{1}{2} = -\cos\left(\frac{\pi}{3}\right) + \frac{\pi}{3} + C$

$\frac{1}{2} = -\frac{1}{2} + \frac{\pi}{3} + C$

$\left(1 - \frac{\pi}{3}\right) = C$

$y = -\cos t + t + \left(1 - \frac{\pi}{3}\right)$

41c) $\frac{dy}{dx} = \frac{x+1}{\sqrt{x}}$; $y(1)=0$

$\frac{x^0}{x^{1/2}}$ | $a^{-m} = \frac{1}{a^m}$

$$\frac{dy}{dx} = \frac{x+1}{\sqrt{x}} = \frac{x}{\sqrt{x}} + \frac{1}{\sqrt{x}} = \frac{x^1}{x^{1/2}} + \frac{1}{x^{1/2}} = x^{1/2} + x^{-1/2}$$

$$\int \frac{dy}{dx}dx = \int x^{1/2} + x^{-1/2}dx$$

$$y = \frac{2x^{3/2}}{3} + \frac{2x^{1/2}}{1} + C = \frac{2x^{3/2}}{3} + 2\sqrt{x} + C$$

when $x=1$, $y=0$

$$0 = \frac{2}{3}(1) + 2(1) + C$$

$$-\frac{8}{3} = -\frac{2}{3} - 2 = C$$

$$y = \frac{2}{3}x^{3/2} + 2\sqrt{x} - \frac{8}{3}$$

39) a point moves along a curve $y=f(x)$ so that at each pt (x,y) on the curve, the slope of the tangent line is $-\sin x$.
Find an equation for the curve given $(0,2)$ is on curve.

$$\frac{dy}{dx} = -\sin x \Rightarrow y = \cos x + C$$

$$2 = \cos(0) + C$$

$$2 = 1 + C \Rightarrow C = 1$$

$$y = \cos x + 1$$

6.2 Homework

2010-10-28 Pd 2

a) $\frac{dy}{dx} = \frac{1}{(2x)^3}$; $y(1) = 0$

$u = 2x$
$du = 2dx$
$\frac{1}{2}du = dx$
$\frac{1}{2}\int u^{-3}\,du$
$\frac{1}{2}\frac{u^{-2}}{-2}+c$
$= \frac{-1}{4(2x)^2}+c$

$\int \frac{1}{8x^3}dx = \frac{1}{8}\int x^{-3}\,dx$

$= \frac{1}{8}\frac{x^{-2}}{-2}+c = -\frac{1}{16x^2}+c$

$y = \frac{-1}{16x^2} + c$

$y(1) = 0$

$0 = \frac{-1}{16(1)^2} + c$

$\therefore c = \frac{1}{16}$

$y = -\frac{1}{16x^2} + \frac{1}{16}$

b) $\frac{dy}{dx} = \sec^2(t) - \sin(t)$; $y(\frac{\pi}{4}) = 1$

$\int \sec^2(t)\,dt - \int \sin(t)\,dt$

$\tan(t) - (-\cos(t)) + C$

$y = \tan(t) + \cos(t) + C$

$y(\frac{\pi}{4}) = 1$

$1 = \tan(\frac{\pi}{4}) + \cos(\frac{\pi}{4}) + c$

$1 = 1 + \frac{\sqrt{2}}{2} + c$

$\therefore c = -\frac{\sqrt{2}}{2}$

$\boxed{y = \tan(t) + \cos(t) + -\frac{\sqrt{2}}{2}}$

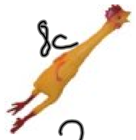
6.2 Homework

2010-10-28 Pd 2

7c 8c

9 2

11



2a) confirm $\int x\sin x\,dx = \sin x - x\cos x + C$

$$\frac{d}{dx}(\sin x) - \frac{d}{dx}(x\cos x) + \frac{d}{dx}(C)$$

$$= \cos x - \boxed{(1)\cos x + x(-\sin x)} + 0$$

$$= \cos x - \cos x + x\sin x$$

$$= x\sin x \quad \checkmark$$

$$\frac{d}{dx}\left((1-x^2)^{1/2}\right) = \frac{1}{2}(\quad)^{-\frac{1}{2}}\frac{d}{dx}(1-x^2)$$

$$\frac{1}{2}(\quad)^{-\frac{1}{2}}\boxed{\frac{d}{dx}(1-(3-x)^2)}$$

$$\frac{d}{dx}(1-(3-x)^2) = \frac{d}{dx}(1) - \frac{d}{dx}(3-x)^2$$

$$0 - 2(\quad)^1\frac{d}{dx}(3-x)$$

$$-1$$

2b) $\int \frac{1}{(1-x^2)^{3/2}}\,dx = \frac{x}{(1-x^2)^{1/2}} + C$

$$\frac{d}{dx}\left(\frac{x}{(1-x^2)^{1/2}} + C\right) = \frac{(1)(1-x^2)^{1/2} - (x)\left(\frac{1}{2}(1-x^2)^{-1/2}(-2x)\right)}{\left((1-x^2)^{1/2}\right)^2}$$

$$= \frac{\left(\frac{\sqrt{1-x^2}}{\sqrt{1-x^2}}\right)\frac{\sqrt{1-x^2}}{1} + \frac{x^2}{\sqrt{1-x^2}}}{(1-x^2)} = \frac{\frac{(1-x^2)}{\sqrt{1-x^2}} + \frac{x^2}{\sqrt{1-x^2}}}{(1-x^2)}$$

$$\sqrt{1-x^2}\cdot\sqrt{1-x^2} = (\sqrt{1-x^2})^2$$

$$\frac{\frac{a}{b}\left(\frac{1}{c}\right)}{c\left(\frac{1}{c}\right)} = \frac{a}{b\cdot c}$$

$$= \frac{\frac{1}{\sqrt{1-x^2}}}{(1-x^2)} = \frac{1}{(1-x^2)^{3/2}}$$

6.2 Homework

2010-10-20 Pd 3

7c) $\int x^3 \sqrt{x}\, dx =$

$$\int (x^3)(x^{1/2})\, dx = \int x^{\frac{7}{2}}\, dx$$

$$= \frac{x^{\frac{9}{2}}}{\frac{9}{2}} + C = \frac{2}{9} x^{\frac{9}{2}} + C$$

8c)

$$\int x^{-\frac{7}{8}}\, dx = \frac{x^{\frac{1}{8}}}{\frac{1}{8}} + C = 8x^{1/8} + C$$

9) $\int \frac{1}{2x^3}\,dx$

$= \frac{1}{2}\int \frac{1}{x^3}\,dx$

$= \frac{1}{2}\int x^{-3}\,dx$

$-3+1 = -2$

$= \left(\frac{1}{2}\right)\left(\frac{x^{-2}}{-2}\right) + C$

$= -\frac{1}{4x^2} + C$

$\int u^3 - 2u + 7\,du$

$\int u^0\,du$

$= \left(\int u^3\,du\right) - \left(2\int u\,du\right) + \left(7\int 1\,du\right)$

$= \frac{u^4}{4} - 2\left(\frac{u^2}{2}\right) + 7(u) + C$

$= \frac{u^4}{4} - u^2 + 7u + C$

$\frac{d}{dx}\left(\frac{u^4}{4}\right) = \frac{1}{4}\frac{d}{dx}(u^4) = \frac{1}{4}(4x^3)$

6.2 Homework

2010-10-20 Pd 3

11) $\int x^{-3} + \sqrt{x} - 3x^{1/4} + x^{2} \, dx$

$$= \int x^{-3}\,dx + \int x^{1/2}\,dx - 3\int x^{1/4}\,dx + \int x^{2}\,dx$$

$$= \frac{x^{-2}}{-2} + \frac{x^{3/2}}{3/2} - 3\left(\frac{x^{5/4}}{5/4}\right) + \frac{x^{3}}{3} + C$$

$$= -\frac{1}{2x^{2}} + \frac{2x^{3/2}}{3} - \frac{12x^{5/4}}{5} + \frac{x^{3}}{3} + C$$

6.2 Homework

2010-10-21 Pd 3

8) $\int \sqrt[3]{x^2}\,dx$

$= \int x^{2/3}\,dx$

$= \dfrac{x^{5/3}}{5/3} + C$

$= \dfrac{3x^{5/3}}{5} + C$

$\int \dfrac{1}{x^6}\,dx$

$\int x^{-6}\,dx$

$= \dfrac{x^{-5}}{-5} + C$

$= -\dfrac{1}{5x^5} + C$

$\int x^{7/8}\,dx$

21

WB

$\dfrac{d}{dx}(e^x) = e^x$

$\dfrac{d}{dx}(\ln x) = \dfrac{1}{x}$

6.2 Homework

2010-10-21 Pd 3

21) $\int 4\sin x + 2\cos x \, dx$

$= 4\int \sin x \, dx + 2\int \cos x \, dx$

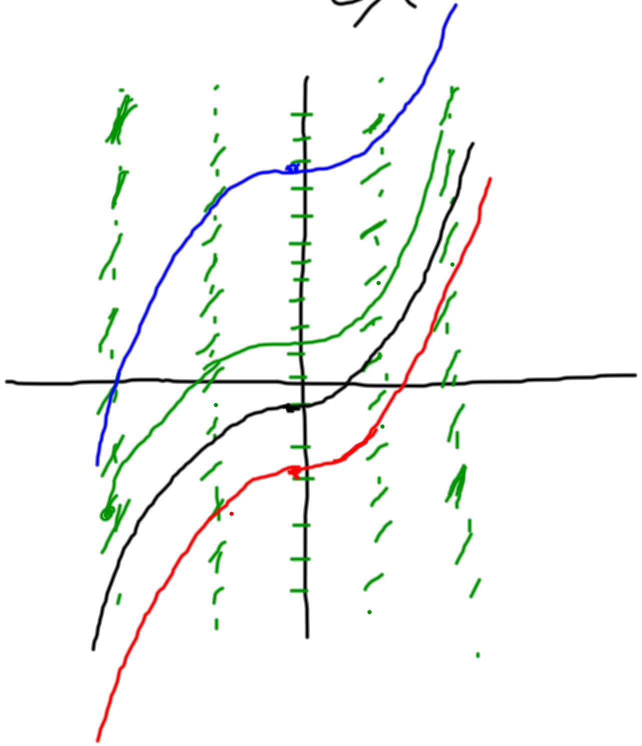
$= 4(-\cos x) + 2(\sin x) + C$

$= -4\cos x + 2\sin x + C$

$\frac{7}{y^{3/4}} = 7y^{-3/4}$

pre 41)

$$\frac{dy}{dx} = x^2 \; ; \quad y(0) = 3$$



x	$\frac{dy}{dx} = x^2$
0	0
1	1
-1	1
2	4
-2	4

Find anti $\left(\frac{dy}{dx}\right)$ = Find ant $\left(x^2\right)$

$$y = \frac{1}{3}x^3 + C$$

when $x=0$, $y=3$

$$3 = \frac{1}{3}(0)^3 + C$$

$$3 = C$$

$$y = \frac{1}{3}x^3 + 3$$


BAGAWK!!

47 39
45
41b

41b $\frac{dy}{dx} = \sin t + 1$; $y\left(\frac{\pi}{3}\right) = \frac{1}{2}$

$$y = -\cos t + t + C$$

$$\frac{1}{2} = -\cos\left(\frac{\pi}{3}\right) + \frac{\pi}{3} + C$$

$$\frac{1}{2} = -\frac{1}{2} + \frac{\pi}{3} + C$$

$$1 - \frac{\pi}{3} = C$$

$$y = -\cos t + t + \left(1 - \frac{\pi}{3}\right)$$

$\frac{d}{dx}(?) = \sin x$

$\frac{d}{dx}(?) = 1$

39) Suppose a pt moves along a curve $\ni$ at (x,y) the slope of the tangent line $= -\sin x$.

Find an eqn for the curve given it skewers $(0,2)$

$$\frac{dy}{dx} = -\sin x \Rightarrow y = \cos x + C$$

$$2 = \cos 0 + C$$

$$2 = 1 + C$$

$$1 = C$$

$$y = \cos x + 1$$

45) Find general form of a function whose 2^{ND} deriv $= \sqrt{x}$

$\sqrt{x} = x^{\frac{1}{2}}$ "$\int$" $x^{\frac{1}{2}} = \frac{2x^{3/2}}{3} + C_1$

$2/3\, x^{3/2}$ "$\int$" $\frac{2x^{3/2}}{3} + C_1 = 2/3(\frac{2}{5}x^{5/2}) + C_1 x + C_2$ $\boxed{2/3 \cdot 2/5 = 4/15}$

$\frac{4x^{5/2}}{15} + C_1 x + C_2$

$\int x + x^2 + x^3 \, dx =$

47) At each pt (x, y) on the curve the slope is $2x+1$; $(-3, 0)$

$$\frac{dy}{dx} = 2x+1$$

$$y = x^2+x+C \longrightarrow y = x^2+x-6$$

$$0 = (-3)^2+(-3)+C$$

$$0 = 9-3+C$$

$$C = -6$$

6.2 Homework

2010-10-28 Pd 3

6.2 Homework

2010-10-28 Pd 3